REMARKS

Claims 6-10 and 13-17 are pending.

Claim Rejection -- 35 U.S.C. 112, First Paragraph

Claims 7 and 14 were rejected as non-enabled. Applicants respectfully traverse the rejection.

Claims 7 and 14 were drawn to methods for adjusting ferromagnetic transition temperature of a ferromagnetic ZnO-type compound, wherein said method comprises controlling the amount of one of (1) to (3), or the combination of at least two metallic elements of (1) or (2) added to the ZnO-type compound, wherein (1) to (3) are:

(1) at least one metallic element selected from a group consisting of transition metallic elements V, Cr, Fe, Co, Ni, Rh or Ru,

(2) at least two metallic elements, one selected from a group consisting of said transition metallic elements, and the other selected from the group consisting of Ti, Mn and Cu, and

(3) either one of said (1), or (2), and at least one of an n-type dopant, and a p-type dopant.

The Office Action held that the specification enables claims 6, 8-13 and 15-17 in regard to the adjustment of ferromagnetic properties other than ferromagnectic transition temperature. However, the Office Action alleges that the specification does not enable the methods of claims 7 and 14 concerning the adjustment of the

ferromagnetic transition temperature because the specification does not teach the necessary amounts and compositions of the additives from groups (1) to (3) in order to produce a ZnO compound having a predetermined ferromagnetic transition temperature. Applicants respectfully disagree.

The specification discloses that the ferromagnetic transition temperature of a ferromagnetic ZnO compound can be adjusted by controlling the amount of an additive taken from one of (1) to (3), or the combination of at least two additives of (1) or (2). Specifically, Figures 3 and 4 provide teachings as to the amounts or combination that can be used to adjust the ferromagnetic transition temperature to a predetermined value. Figure 3(a) shows that the ferromagnetic transition temperature can be adjusted in the range of about 380° to about 950° by using the amount of one of the additives depicted in the graph. For instance, Figure 3(a) shows that a ferromagnetic transition temperature of 700°C can be obtained when about 39 at% of Cr or about 45 at% of Co is added to ZnO. In other words, Figure 3(a) discloses the ferromagnetic transition temperature achievable by the amount of Fe, Cr, Co, Ni or V added to the ZnO compound. Figure 4(a) shows that a ferromagnetic material with a desired ferromagnetic transition temperature ranging from about 0° to about 780° is obtainable by selecting a value of x ranging from 0 to 0.15 in $Fe_{0.25-x}Mn_xZn_{0.75}O$. In other words, Figure 4(a) discloses the relationship between the ferromagnetic transition temperature and the amounts of Fe and Mn added to ZnO. Similarly, Figure 4(b) discloses the relationship between the ferromagnetic transition temperature and the amounts of Fe and Co added to ZnO. With the general teachings in the text portion of the specification

and the specific teachings in Fig. 3 and 4, applicants submit that a person skilled in the art would be able to practice the methods of claims 7 and 14 without undue experimentation.

Withdrawal of the non-enablement rejection of claims 7 and 14 is requested.

Claim Rejections -- 35 U.S.C. 102

Claim 6 was rejected as anticipated by Hager, Dausch, or Miyazaki. Claims 6 and 8-10 were rejected as anticipated by Pfrommer et al. Applicants respectfully traverse the rejections.

These references teach the production of a doped ZnO by adding a dopant to ZnO. The Office Action advanced that (a) Hager teaches doping with Rh or Ru; (b) that Dausch teaches doping with Fe, Co, or Ni; (c) Miyazaki teaches doping with at least one of Cr, B and Ga; and (d) Pfrommer et al discloses producing doped ZnO by crystal mixing Fe and Mn. However, these references are **totally silent on any magnetic properties** of the doped ZnO compound. None of these references teaches or suggests adjusting any magnetic properties of the ZnO compound by controlling the amount of the dopant or the composition of at least two dopants. Since none of the references teaches every recitation of the claims, none of the references anticipates the instant claims.

The fact that these references teach certain ZnO compounds having some of the additives used in the claimed methods does not necessarily mean that the references teach the claimed methods. The Office Action argued that, since "[a]pplicants teach on

page 9, lines 5-14, and page 6, lines 9-15 that the addition of the taught dopants will inherently adjust the ferromagnetic characteristics of ZnO," the references teach the claimed method simply because the references teach adding the dopant in the taught amounts, i.e. "adding the taught dopant in the taught amounts will inherently adjust the ferromagnetic characteristics." Applicants respectfully disagree with the Office Action's assertion that the specification "teaches that the addition of the taught dopants will inherently adjust the ferromagnetic characteristics of ZnO." Specifically, the passages (page 9, lines 5-14, and page 6, lines 9-15) relied upon by the Office Action do not teach "that the addition of the taught dopants will inherently adjust the ferromagnetic characteristics of ZnO." In fact, the specification discloses the adjustment of the ferromagnetic characteristics of the ZnO compound by **controlling** the amounts of one of the additives of groups (1) to (3), or the composition of at least two addtives of group (3) (e.g. see page 4, line 14 to page 5, line 11; page 6, line 2 to page 7, line 25). The word "controlling" is not the same as "adding." The fact that these references teach "**adding**" some of the dopants to ZnO does not mean that the references teach the claimed methods, which require **controlling** the dopant(s) added or the composition of dopants added. Simply **adding** the dopants as taught by the references will not necessarily adjust the ferromagnetic characteristics, if any, of the ZnO compounds of the references to achieve a predetermined value. One needs to control the amount of the dopant or the composition of the dopants to achieve the predetermined value.

Even though the references disclosed adding some of the dopants to ZnO, it should be noted that a ZnO compound having the same composition as the ZnO

compound used in the claimed method can have different physical properties if there are difference crystalline structures. In the present invention, the methods adjust the magnetic characteristics by using a single crystalline ZnO-based compound (e.g. see page 3, line 19 and page 5, lines 9 and 23), but none of the cited references teaches a single crystalline ZnO-based compound. Since no magnetic characteristic is exhibited if a ZnO-based compound does not have a single crystalline structure with excellent crystallinity, there is no reason to believe that the ZnO-based compounds taught by the references has any magnetic characteristics even though the reference-taugth ZnO-based compounds might have some of the same dopants.

In addition, regarding the anticipatory rejection of claims 13 and 15-17, Miyazaki discloses a low emissivity film. Miyazaki also discloses ZnO doped with Ti, Cr, B, Ga, etc. provided on a metal layer located most remotely from a substrate. Miyazaki is silent on any ferromagnetic characteristics. Although the Office Action asserted that Miyazaki teaches doping a single crystalline ZnO, actually Miyazaki does not disclose any single crystalline ZnO. In Miyazaki, the substrate was made of glass or plastic (column 4, lines 52 and 53) and the metal layer 3 lower than the doped ZnO layer 4 is made of Ag, Au, Cu or Pd (column 6, lines 4-8). Thus, the metal layer 3 negates any possibility of the ZnO layer being single crystalline. Unless the base is not single crystalline, any layer (including the ZnO layer 4) formed thereon does not become single crystalline. Therefore, the ZnO compound of Miyazaki should not exhibit any ferromagnetic characteristics. Since the ZnO compound taught by Miyazaki has no ferromagnetic characteristics, Miyazaki does not teach **explicitly or inher ntly** any

method of adjusting the ferromagnetic characteristics of the ZnO compound. This is another reason why the anticipatory rejection over Miyazaki should not have been made.

As a result, it is requested that the anticipatory rejections of claims 6 and 8-10 be withdrawn.

In Conclusion

In view of the above reasoning, applicants believe that a Notice of Allowance is in order.

In the event this paper is not timely filed, Applicants hereby petition for an appropriate extension of time. The fee for this extension may be charged to our Deposit Account No. 01-2300, referring to client-matter number 107400-00016, along with any other fees which may be required with respect to this application.

Respectfully submitted,

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